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## OBSERVATIONS ON THE GENUS ACROSPERMUM<sup>1</sup>

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(WITH PLATE 11, CONTAINING 13 FIGURES)



*Acrospermum* is the name given to a small group of closely related fungi growing on living or dead herbaceous plants or plant-parts. The genus was established in 1790 by Tode in his *Fungi Mecklenburgenses* (part 1, page 8), with *Acrospermum compressum* as the type-species. The plants all have erect fructifications, more or less clavate or spatulate in form. The asci are elongated; contain eight filiform, colorless spores; and are surrounded by capillary paraphyses. The texture is horny when dry, fleshy-cartilaginous when moist. There are two peculiarities which have made the systematic position of the genus uncertain: the fructification is ordinarily compressed (compare Figs. 1 and 2), and the ostiole is elliptical rather than circular (Fig. 5). Ellis and Everhart (*North American Pyrenomycetes* p. 67, 1892) placed *Acrospermum* in the Hypocreales, to which it is obviously allied in texture and in the coloration of most of the species. Rehm, however, transferred the genus to the Hysteriales, because of the two peculiarities mentioned above, and this disposition has been accepted by Lindau, in Engler and Prantl, where he established a family, Acrospermaceae, in the Hysteriales.

Such an arrangement seems scarcely to express natural relationships since all of the Hysteriales are characteristically car-

<sup>1</sup> Contribution from the Cryptogamic Laboratories of Harvard University, No. 88.

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bonaceous and open by a cleft rather than by an elliptical ostiole. In order to determine whether the internal structure might throw light on the true systematic position of the genus, microtome sections of *Acrospermum compressum* and of a new species have been studied and have yielded certain results of interest. Reference to figure 11 will show that the lower part of the fructification is occupied by sterile tissue. This is more or less prosenchymatous in nature, differing from the substance of the wall and reminding one of the hypothecium or trama of a normal apothecium. Nevertheless, this does not necessarily indicate discomycetous affinities, for a similar structure is found in the perithecium of some Pyrenomycetes, for example *Bombardia fasciculata* Fr. Figure 12 illustrates the apical portion of the fructification somewhat more enlarged. It will be noticed that the paraphyses do not form a definite hymenium such as would be found in the Hysteriales, but that they converge loosely toward the ostiole rather in the manner of various Pyrenomycetes. Taking this into account together with the texture, and with the facts that a compressed form and elongated ostiole are found in the Lophiostomaceae, and a sterile basal tissue in *Bombardia* and other genera, it would seem to the writer that the natural conclusion is to consider the fructification a perithecium and to follow Ellis in placing the Acrospermaceae not under the Hysteriales but under the Hypocreales.<sup>2</sup>

Material distributed in the principal exsiccati under the specific name *Acrospermum compressum* Tode shows considerable variation (compare Figs. 7-10). The size varies from 0.8 to 2.5 millimeters. The form varies from spatulate, with the apex almost truncate (Fig. 8) to clavate with an obtuse apex (Fig. 10). The figures cited show a corresponding variation in the development of the stipe: in such perithecia as are figured in Nos. 7 and 8 there is merely a slight contraction below, scarcely to be referred

<sup>2</sup> Owing to delay in the receipt of German journals, because of the war, the present paper was in print before the writer saw a note by Von Hoehnel in the *Annales Mycologici* (15: 379. 1917), in which he expresses the view that *Acrospermum* is undoubtedly one of the Pyrenomycetes. Von Hoehnel believes that the characters in common with *Bombardia* indicate true relationship, and after naming two probable connecting links, he places *Acrospermum* in the Sordariaceae.

to as a stipe; while in the specimens distributed in Libert *Plantae Cryptogamicae Arduennae* No. 32 and in the *Kryptogamae Exsiccatae Vindobonenses* No. 1435, there is a well-defined stipe, cylindrical and of considerable relative length (Fig. 10). The surface varies from even (Fig. 7) to wrinkled (Fig. 8), and longitudinally furrowed (Fig. 10). The color is typically bay-brown,<sup>3</sup> but varies to seal-brown, snuff-brown, and russet; rarely (*e.g.*, Berkeley's British Fungi *Exsiccati* No. 270) it may be dull fuscous-black. The color of any given perithecium is usually fairly uniform throughout, but occasional specimens are seen (*e.g.*, Mougeot and Nestler *Stirpes Cryptogamae Vogeso-Rhenanae* No. 671), where the color becomes gradually paler toward the apex.

Connecting with the typical form of the species and distinguishable only as varieties are two plants which have been described as distinct species. The first of these is *Acrospermum graminum* Libert, usually smaller than *A. compressum*, somewhat darker in color, with a linear outline, and growing on dead leaves of grasses (Fig. 5). Rehm has already reduced this to varietal rank.

The second plant is *Acrospermum foliicolum* Berk. Authentic specimens in the Curtis Herbarium show that in size and in shape, Figs. 9 and 10 would represent this plant as well as the typical form of *A. compressum*. The color of *A. foliicolum* is in general lighter than that of *A. compressum*, being from honey-yellow to russet. But it will be noticed that darker specimens of the former coincide in color with lighter specimens of the latter. The only constant difference that the writer has been able to discover between the two forms is the habitat: all specimens of *A. compressum* that have been seen grow on stems, while all the specimens of *A. foliicolum* grow on Dicotyledonous leaves. This would scarcely seem to be of sufficient importance to maintain a specific difference between the two.

The variations of *Acrospermum compressum* may be summarized as follows:

ACROSPERMUM COMPRESSUM Tode Fungi Mecklenb. 1: 8, t. 2, f.

13. 1790.

<sup>3</sup> All color terms in this paper are taken from Ridgeway: *Color Standards and Nomenclature*. 1912.

a. forma typica. On herbaceous stems; 1–2.5 mm. in height, more or less contracted below, bay-brown. Widely distributed in the United States.

b. var. **GRAMINUM** (Lib.) Rehm in Rabenh. Krypt. Fl. Deutschl. 1<sup>3</sup>: 55. 1887.

*Acrospermum graminum* Libert Pl. Crypt. Ard. fasc. 1, No. 33. 1830, cum descript.

On dead leaves of grasses; 0.4–1.0 mm. in height, linear in outline, chocolate to warm brownish-black. Recorded in the United States from New York, Missouri, and California.

c. var. **foliicolum** (Berk.) Riddle comb. nov.

*Acrospermum foliicolum* Berk. Grevillea 4: 161. 1876.

On dead leaves of *Celtis*, *Cornus*, *Ulmus*, etc.; 0.7–1.5 mm. in height, stipitate, honey-yellow to russet. Apparently confined to the warmer portion of the United States: specimens examined from New Jersey, North and South Carolina, Louisiana, Texas; and recorded from Alabama.

In 1914, Mr. W. R. Maxon, of the United States National Herbarium, sent to Dr. W. G. Farlow specimens of an *Acrospermum* growing on the living fronds of a tropical fern. In the accompanying letter (Oct. 14, 1914), Mr. Maxon says: "I am sending you herewith two specimens of *Polypodium induens* Maxon, these being my 2770 from Jamaica and my 5486 from Panama, both of which seem to be affected with a fungus. I have never seen anything like it, and it seems to me a curious coincidence that what appears to be the same organism should occur upon individuals of the same species from widely separated regions." In a subsequent letter (Dec. 11, 1914), Mr. Maxon adds: "I have gone over all of the material of *P. induens* and find the fungus occurring upon nearly every collection of it." Dr. Farlow recognized that the material represented a new species and named it in honor of Mr. Maxon, labeling the specimens in the herbarium accordingly. No description was published, however, and after Dr. Farlow's death, Mr. Maxon called the present writer's attention to the plant, and suggested the publication of some account of it.

This new species may be described as follows:

**Acrospermum Maxoni** Farlow in herb. sp. nov.

(Plate II, Figures 1-5)

Perithecia solitaria dispersa aut rarius geminata, superficialia erecta, 0.7-1.3 mm. altit., 0.22-0.3 mm. latit., clavata compressa; apice rotundato vel obtuso; infra in stipitem tenuem cylindricem attenuata, stipite 0.2-0.27 mm. altit., 0.07-0.09 mm. diam.; primitus clausa dein ostiolo ellipsoideo aperta; siccis coriaceis, madefactis carneo-cartilagineis; fusco-nigra nitida, apice argillaceo; basi mycelio distincto irregulare rotundato arachnoideo circumcincto, centro fusco, margine stramineo. Asci 8-spori anguste cylindricae elongatae, circa 400  $\mu$  longi, 5  $\mu$  lati; sporidiis hyalinis filiformibus irregulariter flexuosis haud spirale contortis. continuis, parum brevioribus quam ascis, circa 1  $\mu$  latis. Paraphyses copiosae capillariae.

On the under side of living fronds of *Polypodium induens* Maxon, in humid forest, Chiriqui, Panama, March 18, 1911, collected by W. R. Maxon, no. 5486a (type); same locality, no. 5714a; vicinity of Coliblanco, Costa Rica, May 1, 1906, no. 278a; vicinity of Morce's Gap, Jamaica, June 23, 1904, no. 2770a; Apr. 18, 1903, no. 1214 a; Sir John's Peak, Jamaica, no. 1324 a, all collected by W. R. Maxon. Forests of Santa Rosa du Copey, Costa Rica, April, 1898, collected by Tonduz, without number.

On *Polypodium cretatum* Maxon, Monkey Hill, above New Haven Gap, Jamaica, June 22, 1904, collected by W. R. Maxon, nos. 2702a, 2754a; Sir John's Peak, Jamaica, Sept. 1906, collected by L. M. Underwood, no. 3203a.

*Acrospermum Maxoni* differs from *A. compressum* in the contrast between the shining black perithecia and the clay-colored tips; in the peculiar mycelial web, surrounding the base of the perithecium; and in the habit of growing on living ferns. These characters distinguish it also from *A. Puiggarii* Spegazzini (Bol. Acad. Nac. de Ciencias de Cordoba 23: 121. 1919) described as growing over mosses in Brazil and as having black perithecia, becoming pallid toward the base. *Microstelium hyalinum* Patouillard (Bull. Soc. Myc. France 15: 208. pl. 9, f. 1. 1899), encrusting algae and mosses on tree-trunks in Guadeloupe, is said by

its author to be related to *Acrospermum*; and Lindau in the "Nachtraege" to Engler and Prantl's *Naturlichen Pflanzenfamilien I*<sup>1</sup>. 1900, places it in the Acrospermaceae. According to Patouillard's original description, his plant has a superficial mycelium somewhat similar to the mycelial web of *Acrospermum Maxoni*, but also has the perithecium covered with a filamentous "trama."

In 1881, Ellis (Bull. Torrey Bot. Club 8: 124) described a fungus from Utah under the name *Acrospermum corrugatum*. In 1884 the same fungus was found in California by Harkness and named by him *Acrospermum fultum* (Bull. Calif. Acad. 1: 47). An examination of material issued in Ellis and Everhart's North American Fungi Series II, no. 2055, shows that this species has marked peculiarities which distinguish it clearly from all *Acrosperma*, as the following comparison will indicate:

Typical <i>Acrospermum</i>	" <i>Acrospermum corrugatum</i> "
Texture fleshy-cartilaginous.	Texture carbonaceous.
Corrugations occasionally present in dried specimens, but disappearing upon moistening.	Corrugations strongly marked and persistent even when moist.
Ostiole merely elliptical.	Ostiole an elongated, narrow cleft.
Growing on herbaceous plants or plant-parts.	Growing on dead wood.

Since "*Acrospermum corrugatum*" does not possess the typical and characteristic features of a true *Acrospermum*, it became evident that it should be excluded from the genus. Further study led to the discovery that Ellis' plant is identical with the long-known but comparatively rare European species: *Lophium dolabriforme* Wallr. (Flora Crypt. Germ. 2: 433. 1833) not hitherto recognized from the American continent. In addition to the characters already noted, all of the descriptions of *Lophium dolabriforme* emphasize the peculiar rope-like, mycelial strands around the base of the apothecium (see Fig. 13) and these are well shown in the specimens issued in Vestergren *Micromycetes Rariores Selecti* no. 921. In addition to the Utah and California stations, Rostrup (Medd. on Groenl. 18: 61. 1894) has recorded

